

## ER Site No. 113: Area II Firing Sites (TA-II)

ADS: 1303

Operable Unit: Tech Area II

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Primary Contact: [Dick Fate](#)

Office Phone: 284-2568

### Site History

The Area II Firing Sites consisted of two high explosive (HE) firing sites located in the northeastern portion of Technical Area II (TA-II). One site is east of Building 907 and the other is east of Building 922. The firing sites consisted of aboveground "boom boxes" on the east side of each building. They were used to determine the amount of energy required to detonate small explosive devices. The aboveground "boom boxes" were active since about 1965 to the early 1990s.

Testing activities at ER Site 113 occurred several times a day and involved detonating explosive devices. The explosive devices typically consisted of explosive material contained in a metal casing 0.5 inches in diameter and 0.75 inches long. The weight of the explosive charges typically ranged from 0.125 to 0.5 pounds. The explosive devices usually contained a detonator attached to an electrical connector. The detonators were covered with a thin layer of lead, copper, iron, or aluminum. The HE material encased in the metal shell consisted primarily of pyrotechnic powders, such as zirconium potassium perchlorate, titanium potassium perchlorate, or plastic explosives contained in a plastic binder. Other materials that may have been used with the explosive materials include zirconium, manganese, and chromium. The metal shells may have contained depleted uranium on occasion. During the 1960s and 1970s, the metal shells were commonly coated with lead. Mercury fulminate HE was never used at TA-II because of its limited fracturing power.

During a detonation, debris would escape through the open side of the "boom box." The detonated materials, if any, would settle on the ground surface east of Buildings 907 and 922. The distance that the detonated materials traveled depended on the size of the explosive charge. Materials detonated in the "boom boxes" typically traveled about 100 yards east of Buildings 907 and 922. After a detonation, any unburned explosive residues and metal fragments were reportedly collected.

The Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment contains the following:

Hundreds of explosive shots were conducted behind Building 922. Aluminum covered detonators were fired in many of the shots. Some shots may also have contained heavy metals. It is not known what residual materials may be left at this site.

The regional aquifer in the vicinity of ER Site 113 is within the upper unit of the Santa Fe Group. The depth to the regional aquifer in the nearest monitor well to ER Site 113 (TA2-NW1-595) is approximately 520 feet (ft) below ground surface. A shallow water-bearing zone also exists in the vicinity of ER Site 113. The depth to the shallow zone ranges from approximately 267 to 320 ft deep. Monitor wells TA2-SW1-325, TA2-NW1-320, WYO-2, TA2-W-19, and TA2-W-01 are located in the vicinity of ER Site 113 and are screened in the shallow water-bearing zone.

The area is essentially flat, with a gentle slope to the west of approximately 4 percent. Tijeras Arroyo, the largest drainage feature at Sandia National Laboratories/New Mexico (SNL/NM), is located approximately one half mile from this site. The surface geology consists of unconsolidated alluvial and colluvial deposits derived from the granitic rocks of the Sandia Mountains and greenstone, limestone, and quartzite derived from Manzanita Mountains. Surficial deposits are underlain by the upper unit of the Santa Fe Group. In this area, the piedmont-slope alluvium may be up to 100 ft thick, and the upper Santa Fe unit is approximately 1,200 ft thick. The piedmont-slope alluvium, which was deposited by the ancestral Tijeras Arroyo, is generally coarse-grained sand and gravel. The upper Santa Fe unit was deposited from 5 to 1 million years ago and consists of coarse to fine grained fluvial deposits from the ancestral Rio Grande that intertongue with coarse-grained alluvial-fan/piedmont-veneer facies, which extend westward from the Sandia and Manzanita Mountains. ER Site 113 is near the easternmost limit of the ancestral Rio Grande deposits.

Several rift-bounding faults are located east of ER Site 113. The nearest is the Sandia fault-zone, characterized by north-trending, west-dipping normal faults. The westernmost fault is located approximately 1.2 miles east of the site.

In order to determine if potential threats exist to human health or the environment at this site, environmental testing was conducted. Testing included a surface radiation survey, passive soil vapor survey, geophysical survey, and soil sampling. As summarized below, results indicate that further investigation is not necessary and that ER Site 113 should be removed from the ER site list.

On March 20, 1994, a surface radiation survey was performed at the TA-II Firing Sites. The radiation survey was performed using a gamma scintillometer over the entire site areas and a pressurized ionization chamber (PIC). In the area east of Building 907, background activities were measured between 90 and 120 cps with the gamma scintillometer and at 11 to 13 microrentgen/hr with the PIC. In the area east of Building 922, background activities were measured between 80 and 110 cps with the gamma scintillometer, and at 10 to 12 microrentgen/hr with the PIC. The area along the east side of each building is covered with asphalt and the area beyond the asphalt has little or no vegetation. No gamma anomalies were detected.

In November 1993, a passive soil vapor survey investigation was conducted in the areas east of Buildings 907 and 922. No volatile organic compounds or semi-volatile organic compounds were identified from the soil vapor survey investigation in the vicinity of the TA-II Firing Sites.

The firing site located east of Building 907 was included in a geophysical Surface Towed Ordinance Locator System survey conducted in December 1993 and an electromagnetic survey conducted in December 1993. No anomalies related to buried material were identified in the area.

During April 1994, surface and shallow subsurface soil samples were collected east of Buildings 907 and 922. Soil samples were analyzed for HE compounds (HPLC method) and metals (TAL method). Ten surface and three subsurface soil samples were collected east of Building 907. Two surface samples were collected east of Building 922.

Analytical reports show no detection of explosives using method HPLC for all samples. Chromium results ranged from 5.2 mg/kg to 12.5 mg/kg, all below the SNL/NM background concentration of 17.3 mg/kg for surface samples in the north area of SNL/NM and the SNL/NM background concentration of 12.8 mg/kg for subsurface samples at SNL/NM. Copper results ranged from 8.1 mg/kg to 110 mg/kg. The SNL/NM Hazardous and Radioactive Materials Bureau (HRMB) background concentration for copper for soil samples in the north area of SNL/NM is 17.0 mg/kg. Lead was measured from 9.3 mg/kg to 71.4 mg/kg. Guidance provided by EPA in a July 14, 1994 memorandum on residential lead-contaminated soil lists an acceptable level of 400 ppm lead in soil in residential areas. The SNL/NM background concentration for lead in the north area of SNL/NM is 39 mg/kg for surface soil samples and 11.2 mg/kg for subsurface soil samples. Manganese results ranged from 155 mg/kg to 321 mg/kg. Background concentrations for manganese have not been established. Mercury results ranged from < 0.10 mg/kg (detection limit) to 0.23 mg/kg. The SNL/NM background concentration for mercury is <.25 mg/kg for surface soil samples and <0.10 mg/kg for subsurface soil samples.

Action levels for lead have not been identified by Environmental Protection Agency (EPA). Resource Conservation and Recovery Act (RCRA) proposed Subpart S action levels for manganese in food is 10,000 mg/kg and in water is 400 mg/kg. The RCRA proposed Subpart S action level for mercury is 20 mg/kg. Comparison to action levels, risk calculations, and literature review show that the results of the surveys and soil samples indicate that there are no releases of hazardous constituents from this site which would pose a threat to human health and/or the environment.

## Constituents of Concern

High explosives residue

Lead

Mercury

Zirconium

Manganese

Chromium

## Current Hazards

There are no current hazards at this site related to chemical or radiological contamination of the surface or subsurface soils. There are structures or stored materials that remain at the site that are a potential hazard. There is a large compressor in a shed at the site. Cylinders of oxygen, acetylene, and breathing air are stored against the east wall of Bldg. 907. Some small gasoline engines are stored in sheds at the site. The transportainers contain components with sealed radioactive sources. These hazards are related to operations associated with work at the Classified Waste Landfill.

## Current Status of Work

The recommended future land use for ER Site 113 is industrial. A risk-screening assessment was performed for ER Site 113 to evaluate the potential for adverse health effects for the industrial and residential land-use scenarios. The total and incremental human health hazard indices for the industrial land use along with the estimated excess cancer risks for both the industrial and residential land use scenarios were below New Mexico Environment Department (NMED) guidelines. Using the maximum concentration of each COC, the residential land-use total and incremental human health non-radiological hazard indices were above the NMED guideline. The high HIs were driven by cadmium. Because the site was adequately characterized, average concentrations were more representative of actual site conditions. When the 95th upper confidence limit of the mean cadmium concentration (1.47 mg/kg) was used in the risk screening assessment, the incremental hazard index for the residential land-use was reduced to 0.93 (assuming the background cadmium concentration was 1 mg/kg). The incremental hazard index was below the NMED guideline. Using a predictive ecological risk assessment methodology, the ecological risk for this site was acceptable. In conclusion, human health and ecological risks were acceptable per NMED guidance.

ER Site 113 was proposed for NFA in August 1994. In September 2000, additional information and a revised risk assessment requested by NMED was submitted. Subsequent to the additional information being provided, ER Site 113 was deemed acceptable for NFA by the NMED on April 25, 2001. The NFA was approved by NMED on November 19, 2001, after completing the public review and permit modification process.

## Future Work Planned

No future work is planned at ER Site 113.

## Waste Volume Estimated/Generated

No waste was generated at ER Site 113.

**Information for ER Site 113 was last updated Jan 24, 2003.**